

CLAIMS

1. A method in connection with an inverter that comprises several power semiconductor components and a control apparatus to control them, the control apparatus being arranged to control the power semiconductor components in response to a control quantity to generate an output voltage, the method comprising the step of

determining the temperature or an electric quantity affecting the temperature of one or more power semiconductor components, **characterized** by the method also comprising the steps of

determining the change of the temperature or an electric quantity affecting the temperature of one or more power semiconductor components, and

controlling with the control apparatus the power semiconductor components in response to both a control quantity to generate an output voltage and the change rate of the temperature or a quantity affecting the temperature of the power semiconductor components to reduce temperature variation in such a manner that, as the temperature or quantity affecting the temperature increases, the temperature increase rate is slowed down and, as the temperature or quantity affecting the temperature decreases, the temperature decrease rate is slowed down.

2. A method as claimed in claim 1, wherein the inverter also comprises a cooling element arranged to cool the power semiconductor components, **characterized** in that the cooling element is a controllable cooling element, and the method also comprises the step of

controlling the cooling element of the power semiconductor components of the inverter in response to the change rate of the temperature or a quantity affecting the temperature of the power semiconductor components to reduce the temperature change and the change rate.

3. A method as claimed in claim 1 or 2, **characterized** in that the determination of the temperature of a power semiconductor component comprises the steps of

determining the size of the current running through the component and the size of the voltage over the component,

determining the number of switchings in the power semiconductor component, and

calculating the temperature of the power semiconductor component on the basis of the determined size of the current and voltage and the number of switchings by using a temperature model made in advance of the power semiconductor component.

4. A method as claimed in claim 1 or 2, **characterized** in that the control of the power semiconductor components in response to the change rate of the temperature or quantity affecting the temperature of the power semiconductor components to reduce the temperature change and the change rate comprises the step of increasing the switching frequency of the power semiconductor components in response to the decrease of the temperature or quantity affecting the temperature of the power semiconductor components or decreasing the switching frequency of the power semiconductor components in response to the increase of the temperature or quantity affecting the temperature of the power semiconductor components.

5. A method as claimed in claim 1, 2, or 4, **characterized** in that the control of the power semiconductor components in response to the change rate of the temperature or quantity affecting the temperature of the power semiconductor components to reduce the temperature change and the change rate comprises the step of increasing the reactive current level of the power semiconductor components in response to the decrease of the temperature or quantity affecting the temperature of the power semiconductor components or decreasing the reactive current level of the power semiconductor components in response to the increase of the temperature or quantity affecting the temperature of the power semiconductor components.

6. A method as claimed in any one of claims 2 to 5, wherein the cooling element is a motor-operated fan, **characterized** in that the control of the cooling element in response to the change rate of the temperature or quantity affecting the temperature of the power semiconductor components comprises the step of increasing the rotation rate of the motor-operated fan in response to the increase of the temperature or quantity affecting the temperature of the power semiconductor components or decreasing the rotation rate of the motor-operated fan in response to the decrease of the temperature or quantity affecting the temperature of the power semiconductor components.

7. A method as claimed in any one of claims 1 to 6, **characterized** by the method also comprising the step of anticipating a future change

12

in the control quantity leading to a temperature change, and taking steps to reduce the temperature change in response to the anticipation.

8. A method as claimed in any one of claims 1 to 7, **characterized** in that the quantity affecting the temperature is a torque, current or voltage instruction, or a defined torque, current, or voltage of the machine.

9. An arrangement in connection with an inverter that comprises several power semiconductor components and a control apparatus arranged to control them, the control apparatus being arranged to control the power semiconductor components in response to a control quantity to generate an output voltage, the arrangement comprising

means for determining the temperature or an electric quantity affecting the temperature of one or more power semiconductor components, **characterized** by the method also comprising

means for determining the temperature or an electric quantity affecting the temperature of one or more power semiconductor components, and

a control apparatus for controlling the power semiconductor components in response to both the control quantity to generate an output voltage and the temperature or a quantity affecting the temperature of the power semiconductor components to reduce temperature variation in such a manner that, as the temperature or quantity affecting the temperature increases, the temperature increase rate is slowed down and, as the temperature or quantity affecting the temperature decreases, the temperature decrease rate is slowed down.

10. An arrangement as claimed in claim 9, wherein the inverter also comprises a cooling element arranged to cool the power semiconductor components, **characterized** in that the cooling element is a controllable cooling element, and the arrangement also comprises

) means for controlling the cooling element of the power semiconductor components of the inverter in response to the change rate of the temperature or a quantity affecting the temperature of the power semiconductor components to reduce the temperature change and the change rate.